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EXAMINER	
SAXENA, AKASH	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/809,276	CENTALA ET AL.	
	Examiner	Art Unit	
	AKASH SAXENA	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-9,11-23,25-38,40,45 and 46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-9,11-23,25-38,40,45 and 46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 January 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 2-9, 11-23, 25-38, 40, and 45-46 have been presented for examination based on applicant's preliminary amendment of 01/09/2009.
2. Claims 11-13 and 45-46 are amended.
3. Claims 2-9, 11-23, 25-38, 40, and 45-46 remain are rejected under 35 USC 103.
4. This action is made Final.

Response to Claim Rejections - 35 USC § 103

(Argument 1) Applicant has argued in Remarks Pg.12:

> ...These calculations are an output that may be generated once per revolution as a percentage of weight on bit or torque on bit. See Glass, col. 4, lines 53-55. Glass does not disclose using these calculations as anything other than data output. In fact, Glass exclusively teaches balancing cutter loads. See, for example, Glass, Abstract, col. 5, lines 61-64, and Claims 1 and 3.
>
> In contrast, claims 45 and 46 of the present invention require, in part, generating a ratio between the sum of the radial forces and the applied weight on bit and adjusting at least one parameter of the selected drill bit (or bottom hole assembly) based on the generated ratio to output a design. Thus, there are several fundamental differences between the present invention and Glass.

(Response 1) First applicant has *not* claimed for or against the argued limitation "Glass exclusively teaches balancing cutter loads". Examiner disagrees with applicant as glass teaches the following in Col.5 Lines 8-24:

> This analytical tool would allow the bit designer to optimize the bit design for transitional drilling by adjusting cutter size, blade position, bit profile and cutter distribution to minimize the impact effect and optimize the performance of the PDC bit for its intended application.
>
> This graphical method can also be used to show how smooth a transition from one cutter to the next for percent torque per cutter to develop a PDC bit design for directional drilling. Tool face control is a critical element for drilling in a directional application with a PDC bit. Without tool face control, weight on bit can not be applied effectively to achieve competitive rates of penetration. This tool can be utilized to determine if a PDC bit design has a good percent torque per cutter distribution. This will allow the bit designer to adjust bit design parameters such as cutter size, blade position, cutter distribution and bit profile to optimize the performance of the PDC bit for the intended application.
>
> FIGS. 3A and 3B show torque distribution simulations for

Here the components of force and torque are adjusted by changing the bit design parameters as claimed. It is well known in the art how to achieve the goals cited in Glass (See US PGPUB 20010020552 ¶ [0034] by Beaton et al). Beaton also relies on the teachings of T. M. Warren et al, Drag Bit Performance Modeling, paper no. 15617, Society of Petroleum Engineers, Richardson, Tex., 1986, extensively used in the modeling of the PDC bits. Hence applicant's argument that Glass merely discloses using the calculations as anything other than the data output is unfound. Examiner respectfully diagrees as Glass teaches computing radial force as Fx and Fz and weight on bit as Fy.

Glass Col.4 Lines 27-40 states:

> Given the input of bit Rate Of Penetration, Revolutions Per Minute, Rock Strength, cutter type, cutter location, cutter orientation and bed boundary location. The program calculates the reactive force per cutter. These cutter forces are then summed to the orthogonal components of the general force system required to drill at the given input parameters. The orthogonal components are F_x (imbalance), F_y (weight on bit), F_z (imbalance), M_x (imbalance), M_y (torque on bit), M_z (imbalance). These components are summed at the origin of the bit coordinate system. This coordinate system is attached to the bit as defined by the input cutter location data. Cutter forces are defined by a drag force and a penetrating force. The drag force is assumed to

This shows both that the radial forces & WOB are summed and computed.

As for computing the ratio, this is represented as percentage. Glass teaches further in Col.5 Lines 47-56:

> In addition to the above calculations, when the bed boundary is encountered by a cutter, the force on that cutter is changed in proportion to the change in rock strength and amount of engagement area in the bed boundary. The force on a cutter will change in proportion to the above parameters until it is fully engaged below the bed boundary.
>
> The above outputs are generated once per revolution of the bit. The output includes cutter force per revolution as a percent of weight on bit or torque on bit, cutter force per revolution and imbalance force per revolution.

This clearly shows that cutter force (for example Fx or Fz) in ratio to weight on bit (WOB). Hence examiner finds applicant's argument unpersuasive.

Even if for the argument sake Glass does not teach the amended limitation, please see updated rejection for the amended limitation.

(Argument 2) Applicant has argued in Remarks Pg.12:

> As described in the present Specification at paragraph [0004], imbalances between radial forces may cause a rock bit to gyrate (i.e., "whirl"). For example, roller cones independently rotate about an axis oblique to the axis of the bit body. Due to this orientation, a conventional rock bit may experience unbalanced lateral forces (radial forces) that cause the rock bit to gyrate or laterally bounce around the bottomhole and impact the wellbore during drilling, a motion commonly known as gyration, or "whirling." Bit whirling is an undesirable performance characteristic, because it results in inefficient drilling of the bottomhole and can potentially damage the bit prematurely. Therefore, analysis of radial forces acting on the bit (i.e., as a ratio to weight on bit) allow improvements in design, which may include reduced bit whirl (see Specification, paragraph [0005]-[0006]). These design improvements may not possible by simply equalizing cutter forces or torques, as taught by Glass. Glass fails to show or suggest adjusting design parameters based on a ratio between radial forces and applied weight on bit, as required by amended independent claims 45 and 46.

(Response 2) Applicant has merely alleged the underlined feature above and not claimed it otherwise.

(Argument 3) Applicant has argued in Remarks Pg.13:

> To visualize the difference between the present disclosure and Glass, Applicant offers Figure 5 and amended Figure 6, attached, as an example. Figures 5 and 6 show chart plots of distributions of ratios of resultant radial forces to applied weights on bit. Each chart plot enumerates the occurrences of a ratio of the resultant radial force to the applied weight on bit. The frequency of occurrences in each chart plot is presented on the Y-axis as percentages of total drilling time. **The ratios between the resultant radial force and the applied weight on bit are presented on the X-axis in decimal form, i.e., fractions of the radial force to the applied weight on bit. Figure 6 may be considered to show improvements in bit performance relative to Figure 5,** however Applicant points out that the ratios of radial force to weight on bit are not equalized in Figure 6. In contrast, Glass teaches equalizing cutter forces and torques. For example, Glass teaches that the forces which appear on the individual cutting elements of a drill

> bit should be evenly distributed, as far as possible, under transitional conditions as well as under steady-state conditions. See Glass, col. 2, lines 52-55.

(Response 3) Applicant's citation is noted. Please see updated rejection of the ratios in Beaton [0034] as percentage.

Glass is teaching balancing load among the cutting elements of the drill bit which is different than "Glass teaches equalizing cutter forces and torques" as alleged by applicant. Glass does not state this and applicant is requested to provide support for this unsupported allegation. Glass in Col.2 states:

> The present invention teaches that the forces which appear on the individual cutting elements of a drill bit should be evenly distributed, as far as possible, under transitional conditions as well as under steady-state conditions. Thus when the drill bit drills into a layer of harder or softer rock, the chances of an individual cutter receiving a disproportionate load, and possibly breaking, are greatly reduced. Thus in the preferred embodiment cutter loadings are simulated during a transition into harder rock, and in alternative embodiments cutter loadings can be simulated both during transition to harder rock and during transition to softer rock.
>
> The disclosed innovations, in various embodiments, provide one or more of at least the following advantages:

From above it is evident Glass is not talking out equalizing the force components (Fx, & Fz) as disclosed in the application. In fact Glass is only attempting to equalize the torque and load components (My) (Glass: Col.5 Lines 41-47).

No new argument s are presented on Pg.14-15 other than the ones already addressed above.

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 2-7, 14-23 and 25-38 are and 45-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over "The Operational Mechanics of The Rock Bit", Ma et al, Petroleum Industry Press, Copyright 1996, further in view of U.S. Patent 6695073 issued to Glass et al, further in view of US PGPUB 20010020552 A1 by Beaton et al.**

The Ma reference is a study of the dynamics of the interaction between the roller cone drill bit and rock (earth) including bit geometry, kinematics, axial loading, and the balancing (equalization) of forces acting on a roller cone drill bit. In particular, Chapter 6, and to some degree Chapter 5, of Ma sets forth the elements of what he refers to as the "New Methodology" for roller cone bit design. This "New Methodology" includes the use of drilling simulation and computer modeling for optimizing the parameters relating to the design of new roller cone drill bits. (See: page 1, paragraph 2, for condensed overview).

The examiner submits that the teachings of Ma render obvious the claimed limitations of the instant invention as presently claimed as follows:

Regarding independent claim 45: *A method for designing a drill bit, comprising:*

- determining radial forces acting on a selected drill bit during simulated drilling; (6.1, 6.1.2.3, 5.3, 3.3 - 3.5, Ma discloses drilling simulation, forces acting on roller cones

at least at pages 128, 129, section 5.1)

- evaluating the radial forces based on at least one selected criterion; (Ma teaches forces acting on roller cones at least at pages 128, 129, section 5.1, which would be an inherent part of optimizing the 3-D load model using finite element analysis disclosed in sections 6.1-6.2.3 of Ma. (especially, 6.1.1.5))

- wherein evaluating comprises summing magnitudes of the radial forces with respect to a direction to, generate a sum of the radial forces is a limitation not explicitly taught by Ma and is taught by Glass (Glass: Col.4 Lines 27-56)*;*

- comparing the sum of the radial forces to an applied weight-on-bit is a limitation not explicitly taught by Ma and is taught by Glass (Glass: Col.4 Lines 47-56)*; and*

- generating a ratio between the sum of the radial forces and the applied weight-on-bit is a limitation not explicitly taught by Ma and is taught by Glass (Glass: Col.4 Lines 47-56);

- adjusting at least one parameter of the selected drill bit based on the evaluating; (Ma: 6.1, 6.1.1.1, 6.1.2.3, page 232, lines 6-11, Ma sets forth adjusting design parameters; Glass: Col.4 Line 58-Col.5 Line 11.

It would have been obvious to a skilled artisan having access to the teachings Ma at the time of the invention to combine Ma and Glass as both of them are directed towards modeling the drill bit and computing forces which is also a a deficiency in Ma explicitly taught by Glass disclosing programmed calculations of summed orthogonal cutter forces inclusive of weight-on-bit. (CL4-L27-46).

Glass teaches adjusting at least one parameter (Glass Col.5 Lines 8-24) of the selected drill bit based on the generated ratio (WOB and Torque) and outputting a drill bit design based on the generated ratio and the adjusting.

Even is Ma and Glass are presumed not to explicitly teach outputting a drill bit design based on the generated ratio between the WOB (Fy component in Glass) and radial forces (Fx and Fz force components in Glass) to modify, such suggestion is clearly present in Glass Col.5 Lines 8-24.

Beaton explicitly teaches outputting a drill bit design based on the generated ratio between the WOB in [0035] as:

> [0034] **In another aspect of the invention, it has been determined that the drilling stability of a bi-center bit can be further improved by force balancing the entire bit 10 as a single structure**. Force balancing is described, for example, in, T. M. Warren et al, Drag Bit Performance Modeling, paper no. 15617, Society of Petroleum Engineers, Richardson, Tex., 1986. Prior art bi-center bits were force balanced, but in a different way. **In this embodiment of the invention the forces exerted by each PDC cutters 12 can be calculated individually, and the locations of the blades and the PDC cutter 12 thereon can be selected so that the sum of all the forces exerted by each of the cutters 12 will have a net imbalance of less than about 10 percent of the total axial force exerted on the bit (known in the art as the "weight on bit").** The designs of both the pilot section 13 and the reaming section 15 are optimized simultaneously in this aspect of the invention to result in the preferred force balance. **An improvement to drilling stability can result from force balancing according to this aspect of the invention because the directional components of the forces exerted by each individual cutter 12 are accounted for.** In the prior art, some directional force components, which although summed to the net lateral force exerted individually by the reaming section and pilot section, can result in large unexpected side forces when the individual cutter forces are summed in the aggregate in one section of the bit to offset the aggregate force exerted by the other section of the bit. **This aspect of the invention avoids this potential problem of large unexpected side forces by providing that the locations of and shapes of the blades 14, 1 and cutters 12 are such that the sum of the forces exerted by all of the PDC cutters 12, irrespective of whether they are in the pilot section 13 or in the reaming section 15, is less than about 10 percent of the weight on bit.** It has been determined that still further improvement to the performance of the bit 10 can be obtained by balancing the forces to within 5 percent of the axial force on the bit 10.

It would have been obvious to a skilled artisan having access to the teachings Ma at the time of the invention to combine Beaton and Glass as Beaton cures the recognized deficiency in Glass of force balancing the entire PDC drill bit (Beaton: [0034]; Glass: Col.5 Lines 8-24) thereby increasing the stability of bi-center drill bit.

<u>Regarding independent claim 46</u>: *A method for designing a bottom hole assembly, comprising:*

- <u>determining radial forces acting on a bottom hole assembly during simulated drilling, said bottom hole assembly including a drill bit</u>. (6.1, 6.1.2.3, 5.3, 3.3 - 3.5, Ma discloses drilling simulation, forces acting on roller cones at least at pages 128, 129, section 5.1, and a bottom pattern modeling at least in Figures 5-20 to 5-32)

- <u>evaluating the radial forces based on at least one selected criterion</u>; (Ma teaches forces acting on roller cones at least at pages 128, 129, section 5.1, which would be an inherent part of optimizing the 3-D load model using finite element analysis disclosed in sections 6.1-6.2.3 of Ma. (especially, 6.1.1.5))

- *<u>wherein evaluating comprises summing magnitudes of the radial forces with respect to a direction to, generate a sum of the radial forces</u>* is a limitation not explicitly taught by Ma and is taught by Glass (Glass: Col.4 Lines 27-56)*;*

- *<u>comparing the sum of the radial forces to an applied weight-on-bit</u>* is a limitation not explicitly taught by Ma and is taught by Glass (Glass: Col.4 Lines 47-56)*; and*

- *<u>generating a ratio between the sum of the radial forces and the applied weight-on-bit</u>* is a limitation not explicitly taught by Ma and is taught by Glass (Glass: Col.4 Lines 47-56);

- <u>adjusting at least one parameter of the bottom hole assembly based on the evaluation</u> (6.1, 6.1.1.1, 6.1.2.3, page 232, lines 6-11, Ma sets forth adjusting design parameters *Glass: Col.4 Line 58-Col.5 Line 11).*

Hence, it would have been obvious to a skilled artisan having access to the teachings Ma at the time of the invention to realize the elements of the present invention as currently claimed. An obvious motivation exists since Ma teaches that

the elements as claimed, and noted above, can be combined in order to find an optimum design and avoid bit (breakage) failure (chapter 6, section 5.4, especially page 232, based on the entire teaching).

It would have been obvious to a skilled artisan having access to the teachings Ma at the time of the invention to combine Ma and Glass as both of them are directed towards modeling the drill bit and computing forces which is also a a deficiency in Ma explicitly taught by Glass disclosing programmed calculations of summed orthogonal cutter forces inclusive of weight-on-bit. (CL4-L27-46).

Glass teaches adjusting at least one parameter (Glass Col.5 Lines 8-24) of the selected drill bit based on the generated ratio (WOB and Torque) and outputting a drill bit design based on the generated ratio and the adjusting.

Even is Ma and Glass are presumed not to explicitly teach outputting a drill bit design based on the generated ratio between the WOB (Fy component in Glass) and radial forces (Fx and Fz force components in Glass) to modify, such suggestion is clearly present in Glass Col.5 Lines 8-24.

Beaton explicitly teaches outputting a drill bit design based on the generated ratio between the WOB in [0035] as:

> [0034] **In another aspect of the invention, it has been determined that the drilling stability of a bi-center bit can be further improved by force balancing the entire bit 10 as a single structure**. Force balancing is described, for example, in, T. M. Warren et al, Drag Bit Performance Modeling, paper no. 15617, Society of Petroleum Engineers, Richardson, Tex., 1986. Prior art bi-center bits were force balanced, but in a different way. **In this embodiment of the invention the forces exerted by each PDC cutters 12 can be calculated individually, and the locations of the blades and the PDC cutter 12 thereon can be selected so that the sum of all the forces exerted by each of the cutters 12 will have a net imbalance of less than about 10 percent of the total axial force exerted on the bit (known in the art as the "weight on bit").** The designs of both the pilot section 13 and the reaming section 15 are optimized simultaneously in this aspect of the invention to result in the preferred force balance. **An improvement to drilling stability can result from force balancing according to this aspect of the invention because the directional components of the forces exerted by each individual cutter 12 are accounted for.** In the prior art, some directional force components, which although summed to the net lateral force exerted individually by the reaming section and pilot section, can result in large unexpected side forces when the individual cutter forces are

> summed in the aggregate in one section of the bit to offset the aggregate force exerted by the other section of the bit. **This aspect of the invention avoids this potential problem of large unexpected side forces by providing that the locations of and shapes of the blades 14, 1 and cutters 12 are such that the sum of the forces exerted by all of the PDC cutters 12, irrespective of whether they are in the pilot section 13 or in the reaming section 15, is less than about 10 percent of the weight on bit.** It has been determined that still further improvement to the performance of the bit 10 can be obtained by balancing the forces to within 5 percent of the axial force on the bit 10.

It would have been obvious to a skilled artisan having access to the teachings Ma at the time of the invention to combine Beaton and Glass as Beaton cures the recognized deficiency in Glass of force balancing the entire PDC drill bit (Beaton: [0034]; Glass: Col.5 Lines 8-24) thereby increasing the stability of bi-center drill bit.

Per claims 2-7: *Ma renders obvious elements relating to performance parameters and cutting element interaction of a roller cone bit as noted above (6.1, 6.1.1.1, 6.1.2.3, page 232, lines 6-11)*

Per claims 12-13

Beaton teaches the ratio of the sum of the radial forces to the applied weight on bit is less than or equal to 0.10 or 0.05 (Beaton: [0034]).

Per claims 14-23 and 25-35: *The recited box-whisker plot is simply a well-known convenient way of graphically depicting a number summary, which consists of the smallest observation, lower quartile, median, upper quartile, and largest observation (See: CRC, or Wikipedia, for example) and hence would have knowingly been implemented by a skilled artisan in order to graphically depict the summed forces.*

Per claims 36-38: *Ma teaches adjusting bit design parameter (Section 6.1.2.3) and bit parameters (Ma: Chapter 2).*

6. **Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable under Ma, in view of Glass, further in view of Beaton, in further view of US. Patent 6039131 issued to Beaton (Beaton2 hereafter).**

Regarding Claim 11

Teachings of Ma, Glass and Beaton are shown in the parent claim 45.

Ma, Glass and Beaton do not explicitly teach the ratio of the sum of the radial forces to the applied weight on bit is less than or equal to 0.20.

Beaton2 teaches the ratio of the sum of the radial forces to the applied weight on bit is less than or equal to 0.20 (Beaton2: Col.3 Lines 7-11).

Hence a skilled artisan would have knowingly modified the teachings of Beaton2 with the teachings of Beaton as Beaton2 is Beaton's own work in an analogous field of PDC drill bit design.

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7. **Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable under Ma, in view of Glass, further in view of Beaton, in further view of "Drag-Bit Performance Modeling, Warren et al, SPE Drilling Engineering, June 1989"**

Analogous art Warren renders obvious elements of the present invention relating to simulating the fixed cutter drill bit drilling an earth formation; (pp. 119, col. 1, para:3-7, pp. 126, col. 1, para:2 to col. 2, para:3, Fig. 6) and determining a cutter-formation interaction force, relative sliding velocity, and cutting surface parameters on a cutter of the fixed cutter drill bit (pp. 19, col. 1, para:6, 7, pp. 126, col. 1, para:2 to col. 2, para:3, Fig. 6, Fig. 6).

Motivation to combine Ma with Glass is presented in the parent claim 45.

Motivation to combine Beaton with Glass is presented in the parent claim 45.

Hence a skilled artisan would have knowingly modified the teachings of Ma with the teachings of Warren, motivated using the same reasoning as previously cited above, to model and implement a fixed cutter drill bit. Ma teaches simulation and computation of forces acting on the drill bit (Ma: Section 5.3 "Simulation Test of the crater forming process by bit teeth" and at least on Pg.202 – as shown on previous page). Ma acknowledges that computer aided simulation and display is anticipated (Ma: Pg.207) analogous to the teaching of Warren (Warren: *pp. 126, col. 1, para:2 to col. 2, para:3, Fig. 6, Fig. 6*) and Glass (Glass: *Col.4 Line 58-Col.5 Line 11*).

Other Relevant Prior Art

8. US Patent 5165494 by Barr (dated Nov 24 1992) acknowledges the computation of the claimed ratio of the lateral (radial) forces and WOB contributing to the whirl effect claimed by applicant and reducing it minimize bit wear (See Background).

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AKASH SAXENA whose telephone number is (571)272-8351. The examiner can normally be reached on 8:00- 6:00 PM Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini S. Shah can be reached on (571)272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kamini S Shah/
Supervisory Patent Examiner, Art Unit 2128

/Akash Saxena/
Examiner, Art Unit 2128